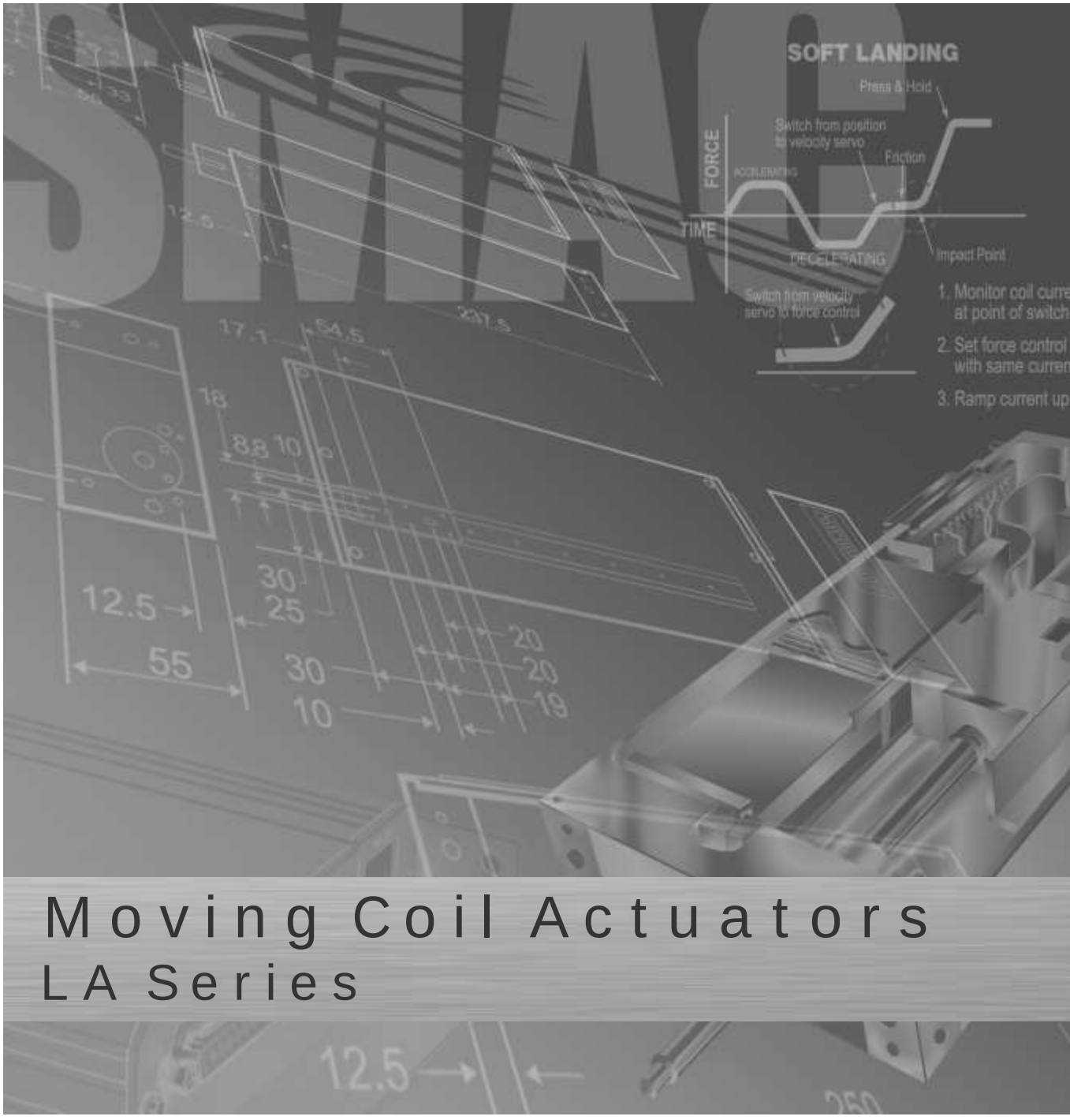
SMAC



Moving Coil Actuators

LA Series

The ability to do work and verify its accuracy at the same time.

2009 Rev.3

SMAC Product Overview

Linear & Rotary / Linear Actuators

LAL10
Stroke [mm]: 10
Force [N]: 2.8

LAL15 / LAR15
Stroke [mm]: 15
Force [N]: 3.8

LAL20 / LAR20
Stroke [mm]: 10, 15,25
Force [N]: 8, 7, 4

LAL35 / LAR35
Stroke [mm]: 50
Force [N]: 10

LAL55 / LAR55
Stroke [mm]: 50, 100, 150
Force [N]: 25, 16, 13

LAL95 / LAR95
Stroke [mm]: 15, 50
Force [N]: 84, 65

LAL300
Stroke [mm]: 50
Force [N]: 250

LAL500
Stroke [mm]: 25, 50
Force [N]: 500

Linear Slide Actuators

LAS10
Stroke [mm]: 10
Force [N]: 3.8

LAS15
Stroke [mm]: 15
Force [N]: 3.8

LAS20
Stroke [mm]: 10, 15, 25
Force [N]: 8, 7, 4

LASW20
Stroke [mm]: 11
Force [N]:

LAS35
Stroke [mm]: 50
Force [N]: 10

LAS55
Stroke [mm]: 50, 100, 150
Force [N]: 25, 16, 13

LAS95
Stroke [mm]: 15, 50
Force [N]: 100, 60

Grippers

GRP17
Stroke [mm]: 10
Force [N]: 5

GRP20
Stroke [mm]: 10
Force [N]: 8

GRP35
Stroke [mm]: 30
Force [N]: 25

GRP50
Stroke [mm]: 30
Force [N]: 45

XY Stages

LXY10
Stroke [mm]: 10
Force [N]: 15

LXY15
Stroke [mm]: 15
Force [N]: 25

LXY25
Stroke [mm]: 25
Force [N]: 42

LXYM15
Stroke [mm]: 15
Force [N]: 14 - 27

Controllers & Amplifier

LAC-1
Single axis controller

LAC-25
2 axis controller with built in amp

LAC-45
4 axis controller with built in amp

MAAC4-7
Multi axes [4] Galil based controller

LAB-5
Single axis brushless controller, built in amplifier

Built-in Controller

LAA-5
Amplifier for 1 axis

LAD-1
Smart drive for 1 axis

New Products

SMAC is continuously adding new models to its product range. Listed below are recent products developed to meet emerging technological demands and specific customer requests. These units are currently available but not yet considered standard models and therefore subject to change. Outline drawings are available on the SMAC website or from your local SMAC representative.

Electric Cylinder CA Series

The CA series of electric cylinders have been designed for the most demanding of automation tasks in mind and are the first real linear motors challenge to pneumatic devices.
They offer a long life cycle and much more precise & repeatable force control and positioning than conventional pneumatic devices. Conventional shape and mounting fit exactly where standard pneumatic cylinders are currently used. Please refer to the CA catalog for more detail.

CAL12
Stroke [mm]: 10
Force [N]: 1.5
12mm diameter

50G acceleration

CAL36
Stroke [mm]: 15, 25, 50
Force [N]: 12 - 18
36mm diameter

CAL35
Stroke [mm]: 15, 25, 50
Force [N]: 4.5 - 34
35mm diameter

NEW

LAC-15 / LAC-20
Single or double axis brushless controller.
Easy expansion to multi-axis

CAL75
Stroke [mm]: 15, 25, 50
Force [N]: 25 - 90
75mm diameter

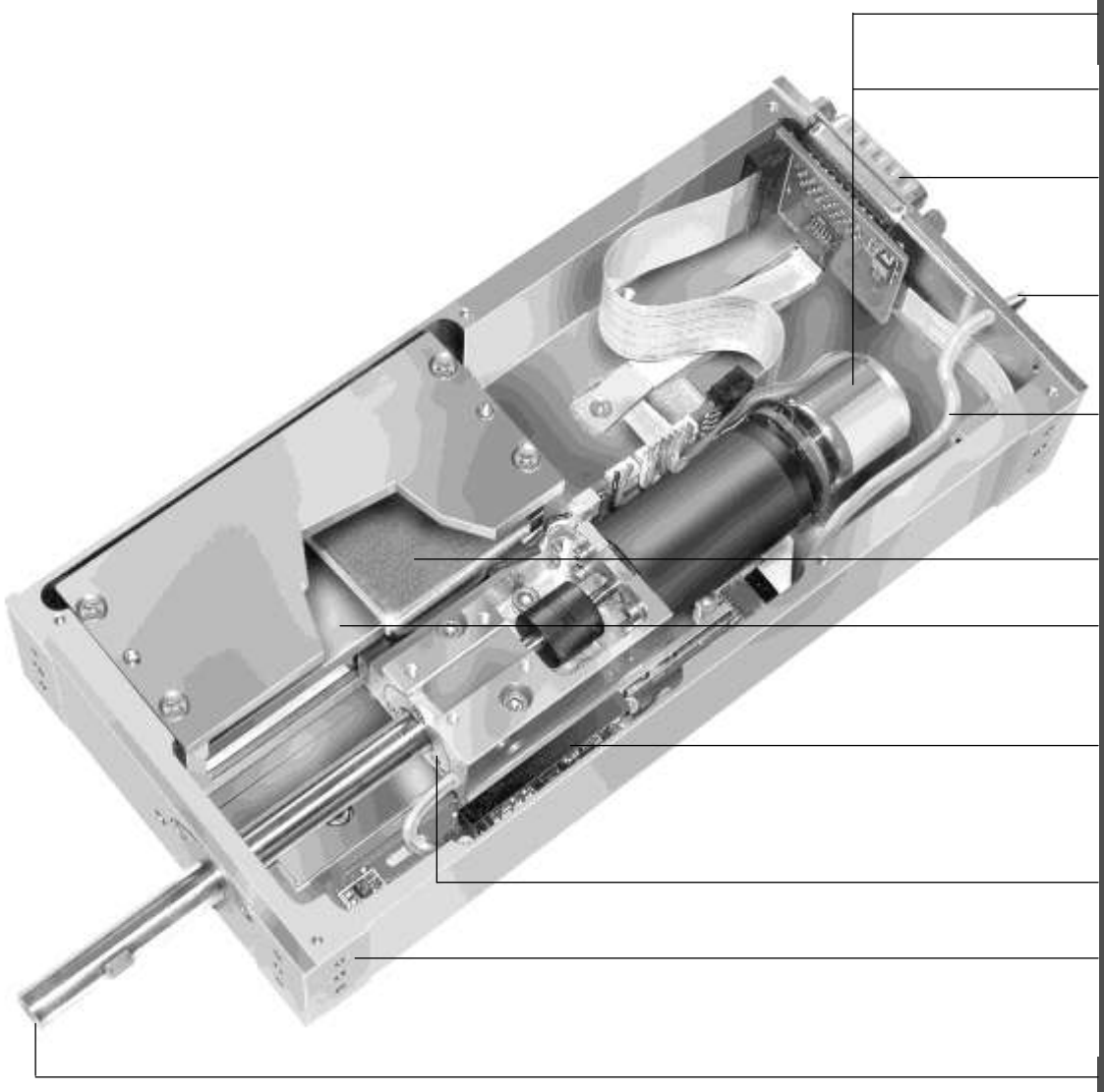
Linear and Linear / Rotary Moving Coil Actuators

Linear:

- Stroke up to 200mm, force up to 500N, position encoder resolution 5µm standard, 1, 0.5 and 0.1µm option for most actuators.
- Programmable force, position, acceleration and velocity.

Rotary:

- Multi-turn servo motor, torque up to 1Nm (Gearbox), velocity up to 5000 rpm, resolution up to 50,000 increments per revolution.
- Programmable force, position, acceleration and velocity.



The SMAC Advantages

- Absolute control over: force, position, acceleration and velocity
- Direct drive actuator, therefore a very high degree of accuracy & repeatability
- Integrated position measuring system with glass scale and optical reader head (no wear)
- Very long lifetime due to oversized linear guides
- Force measurement through monitoring of current
- Digital and analog in/output channels
- Ability to switch between operations - force, position and velocity mode - at any time
- Extremely high acceleration and velocity
- Unique “Soft-Land” function

Programmable Features

The actuator is totally programmable for force, acceleration and velocity, and can operate in three different modes:

Force Mode: Force Mode is open loop, using no feed back from the encoder. The actual position is still monitored but has no effect upon the output.

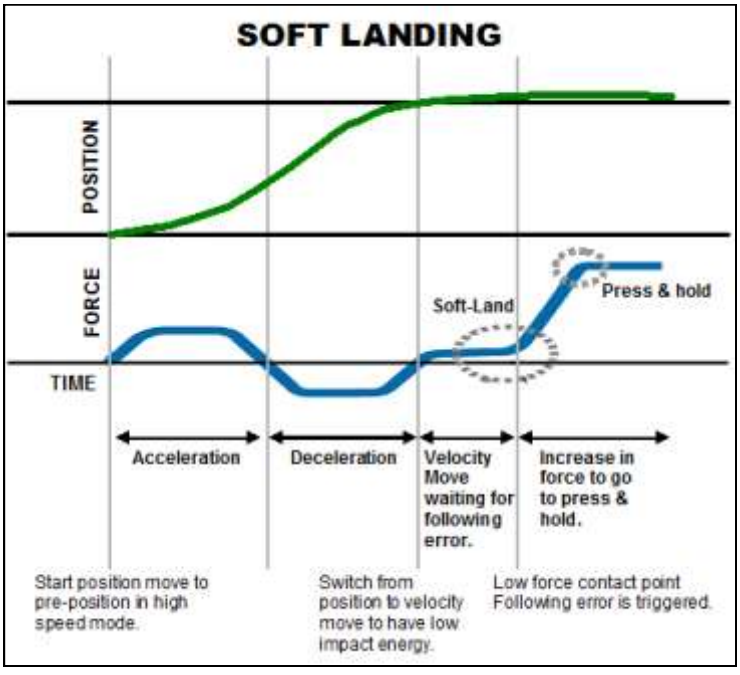
Velocity Mode: Velocity Mode allows the actuating rod to be moved with a given velocity, acceleration, force and direction. Typically used for a “Soft-Land” routine.

Position Mode: Position Mode will allow the actuating rod to be moved to various positions along the stroke using acceleration, velocity and force. It is possible to perform absolute, relative and “learned position” moves.

What is a Soft-Land?

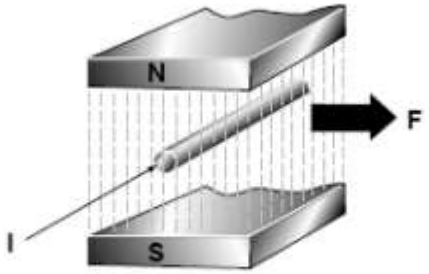
The “**Soft-Land”** is a routine which allows the actuator rod or gripper jaw to land on the surface of a component with a low programmed force. This is particularly useful for handling delicate or high value components.

The routine consists of a controlled low force approach in velocity mode, whilst the position error is constantly monitored. Once contact is made the position error builds up until a pre-programmed figure is reached - resulting in the rod maintaining position on the surface of the component.


SOFT LANDING
POSITION
FORCE
TIME
Soft-Land
Press & hold
Acceleration
Deceleration
Velocity Move waiting for following error.
Increase in force to go to press & hold.
Start position move to pre-position in high speed mode.
Switch from position to velocity move to have low impact energy.
Low force contact point Following error is triggered.

Moving Coil Technology (Voice Coil)

At the heart of all SMAC actuators is the moving coil, also described as a voice coil actuator. The essential principle is the same as you will find in any permanent magnet loudspeaker. The coil is enclosed in a magnet housing, and by passing a current through the coil, a magnetic field is generated.



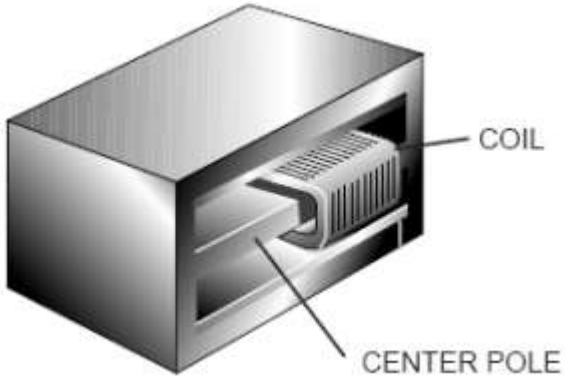
The amount of force generated is governed by the equation

$$F \alpha N I B$$

where;

F is the force generated
N is the number of turns in the winding (Constant)
I is the current flowing through the winding and
B is the magnetic flux (Constant)

Therefore, doubling **I (current)** doubles **F (Force).**



Part Numbering System

MODEL	SERIES	STROKE	VOLT	ENCODER	SHAFT	VACUUM	SPRING	MOD
LINEAR	LAL300	050						
LINEAR/ROTARY	LAR35	050						
SLIDE	LAS55	100						
XY TABLE	LXY							
GRIPPER	GRP							

5	= 24 volt single coil
6	= 24 volt double coil*
7	= 48 volt single coil
8	= 48 volt double coil*
0	**= 0.5µm**
1	**= 1.0µm**
5	**= 5.0µm (standard)**
2	**= 0.1µm***
B	= BLANK
F	= FEMALE
M	= MALE
C	= CUSTOM
V	= VACUUM
S	= SRPING

* check availability

Part Number Examples:

LAS20-010-55

LAS20 linear slide, 10mm stroke, 24volt single coil,
5 micron encoder.

LAL300-050-85-F

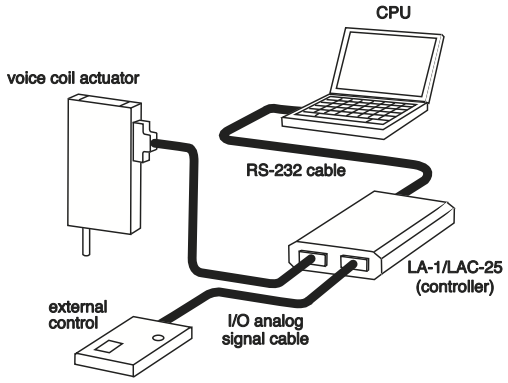
LAL300 linear actuator,50mm stroke, 48volt double coil
5 micron encoder, female rod end.

LAR55-100-75-MS-MOD674

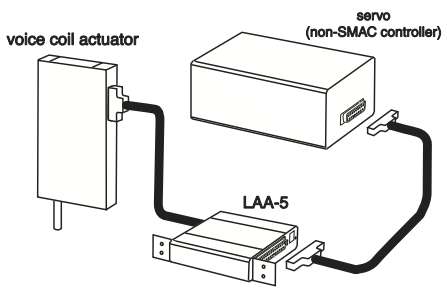
LAR55 linear/rotary actuator, 100mm stroke, 48 volt single coil,
5 micron encoder, male thread, spring,
mod 674 specification.

NOTES: Series will not have leading zeros (e.g. LAL95).
Stroke must include zeros (e.g. 050).
Spring must be specified as full return or counterbalance, payload and orientation (vertical or horizontal).

Hardware Configuration



Hardware with SMAC Controllers



Hardware with SMAC Amplifier

Linear Actuators

	Voltage [DC]	Size: LxWxH [mm]	Stroke [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]
LAL10-005-5	24	45x70x10	5	3.8	1.5	2.5	0.02	0.1
LAL15-015-5	24	120x58x15	15	5	2	2.7	0.05	0.23
LAL20-010-5	24	85x65x20	10	8	3.2	5.5	0.07	0.30
LAL20-015-5	24	65x115x20	15	7	2.8	5	0.07	0.34
LAL20-015-6	24	65x115x20	15	12	4.8	5.8	0.08	0.34
LAL20-025-5	24	85x65x20	25	5.4	2	3.4	0.08	0.36
LAL35-025-6	24	135x90x35	25	31.5	12.6	15.5	0.19	1.06
LAL35-025-7	48	135x90x35	25	18	7	10	0.12	0.95
LAL35-050-5	24	135x90x35	50	10	4	7	0.13	1.1
LAL35-050-7	48	135x90x35	50	12.5	5	10	0.13	1.1
LAL35-100-5	24	135x90x35	100	6	2.4	3.5	0.1	1.7
LAL55-050-5	24	250x110x55	50	25	10	19	0.3	3
LAL55-050-7	48	250x110x55	50	40	16	24.5	0.3	3
LAL55-100-5	24	250x110x55	100	16	6.4	13	0.3	3.8
LAL55-100-7	48	250x110x55	100	25	10	17	0.3	3.8
LAL55-150-5	24	250x110x55	150	13	5	10	0.4	4.5
LAL55-150-7	48	250x110x55	150	19.5	8	12.5	0.4	4.5
LAL95-015-7	48	90x70x95	15	84	33	53	0.25	2.2
LAL95-015-8	48	147x70x95	15	195	78	60	0.5	4
LAL95-025-8	48	180x70x95	25	162	65	52	0.58	3.75
LAL95-050-7	48	147x70x95	50	65	26	41	0.25	3
LAL300-050-8	48	210x85x120	50	202	80	86	0.8	8.8
LAL500-025-8	48	300x140x200	25	500	200	166	1.6	26.5
LAL500-050-8	48	300x140x200	50	500	200	100	1.6	26.5

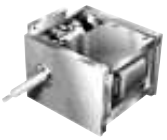
LAL10

LAL15

LAL20

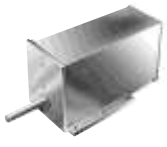
LAL35

LAL55



LAL95

LAL300



LAL500

NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate duty cycle.

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list. Linear actuators are also available as linear slides (LAS series).

Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm & 0.1µm optional for most units. Consult factory for availability.
Shaft ends:	Male, Female, Blank and Custom (check availability of custom option)
Return spring:	Prevents the shaft from dropping during vertical operation when power is cut.
Vacuum through the shaft:	For pick and place applications
Extended nose bushing:	For tighter shaft run-out and higher side load onto the shaft.
Increase of maximum force & acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of force accuracy & lifetime:	Extra long life linear guide Low friction linear guide

Linear & Rotary Actuators

	Voltage [DC]	Size: LxWxH [mm]	Stroke [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]	Maximum Torque* [Nm]	Rotary type	Rotary Encoder Resolution	Velocity* [rpm]
LAR15-015-5	24	120x58x15	15	5	2	2.7	0.095	0.25	0.008	direct	20K	500
LAR20-015-5	24	115x65x20	15	7	2.8	5	0.09	0.41	0.008	direct	20K	500
LAR31-017-5	24	140x77.25x35	17	14	5.6	10	0.22	0.85	0.066	direct	20K	500
LAR31-027-5	24	140x77.25x35	27	12	4.8	7	0.2	0.85	0.066	direct	20K	500
LAR35-025-5	24	190x90x35	25	12	4.8	7	0.14	1.2	0.085	direct	20K	500 - 5000
LAR35-050-5	24	190x90x35	50	10	4	7	0.29	1.4	0.085	direct	20K	500 - 5000
LAR55-050-5	24	250x110x55	50	25	10	19	0.5	3.1	0.2 - 2.5	direct or gear box	2K-28K	500 - 5000
LAR55-050-7	48	250x110x55	50	40	16	27	0.31	2.8	0.2 - 2.5		2K-28K	500 - 5000
LAR55-100-5	24	250x250x55	100	16	6.4	13	0.5	3.85	0.2 - 2.5		2K-28K	500 - 5000
LAR55-100-7	48	250x250x55	100	25	10	18	0.5	3.85	0.2 - 2.5		2K-28K	500 - 5000
LAR95-015-7	48	304x90x115	15	84	33	53	0.9	3.5	0.2 - 4.5		2K-132K	75 - 5000
LAR95-050-7	48	304x90x115	50	65	26	41	0.9	4.2	0.2 - 4.5		2K-132K	75 - 5000
LAR300-050-8	48	284x85x160	50	202	80	86	1	9.5	0.2 –4.5		2K-132K	75 - 5000

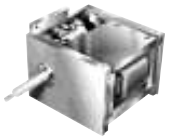
LAR15

LAR20

LAR31

LAR35

LAR55


LAR95

LAR300

NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate duty cycle.

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list.

Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm & 0.1µm optional for most units. Consult factory for availability.
Shaft ends:	Male, Female, Blank and Custom (check availability of custom option)
Return spring:	Prevents the shaft from dropping during vertical operation when power is cut.
Vacuum through the shaft:	For pick and place applications
Extended nose bushing:	For tighter shaft run-out and higher side load onto the shaft.
Increase of maximum force and acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of torque/gear ratio:	Alternative geared motors are available for some units.
Rotary encoder resolution:	Consult factory for higher resolution.
Increase of force accuracy & lifetime:	Extra long life linear guide Low friction linear guide

* Torque and velocity can vary based on your specific application.

Linear Slide Actuators

	Voltage [DC]	Size: LxWxH [mm]	Stroke [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]
LAS10-005-5	24	45x70x10	5	3.8	1.5	2.5	0.02	0.11
LAS15-015-5	24	120x58x15	15	5	2	2.7	0.05	0.23
LAS20-010-5	24	85x65x20	10	8	3.2	5.5	0.07	0.34
LAS20-015-5	24	65x115x20	15	7	2.8	5	0.07	0.34
LAS20W-015-6	24	75x135x20	15	12	4.8	5.8	0.122	0.54
LAS20-025-5	24	85x65x20	25	5.5	2	2.8	0.07	0.34
LASW20-011-5	24	85x75x23	11	8	3.2	5.5	0.07	0.3
LAS35-025-6	24	135x90x35	25	31.5	12.6	15.5	0.19	1.06
LAS35-025-7	48	150x90x35	25	18	7	10	0.15	0.95
LAS35-050-5	24	135x90x35	50	10	4	7	0.13	1.1
LAS35-050-7	48	135x90x35	50	12.5	5	10	0.13	1.1
LAS35-100-5	24	135x90x35	100	6	2.4	3.5	0.13	1.7
LAS35-100-7	48	135x90x35	100	7.5	3	5	0.1	1.3
LAS55-050-5	24	250x110x55	50	25	10	19	0.3	3
LAS55-050-7	48	250x110x55	50	40	16	24.5	0.31	3
LAS55-100-5	24	250x110x55	100	16	6.4	13	0.3	3.8
LAS55-100-7	48	250x110x55	100	35	10	19	0.31	3.8
LAS55-150-5	24	250x110x55	150	13	5	10	0.4	4.5
LAS55-150-7	48	250x110x55	150	19.5	8	13	0.31	4.58
LAS95-015-7	48	90x70x95	15	84	33	53	0.25	2.1
LAS95-015-8	48	147x70x95	15	195	78	60	0.5	4
LAS95-025-8	48	180x70x95	25	162	65	52	0.5	3.78
LAS95-050-7	48	147x70x95	50	65	26	41	0.25	3
LAS300-050-8	48	210x85x120	50	202	80	86	0.8	8.8

LAS10

LAS15

LAS20

LASW20

LAS30

LAS35

LAS55

LAS95

NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate duty cycle.

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list.

Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm & 0.1µm optional for most units. Consult factory for availability.
Return spring:	Prevents the shaft from dropping during vertical operation when power is cut.
Increase of maximum force & acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of force accuracy & lifetime:	Extra long life linear guide Low friction linear guide

Grippers

				Axis 1				Axis 2					
	Voltage [DC]	Size: LxWxH [mm]	Stroke per Axis [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]	Maximum Opening
GRP17-010-5	24	55x70x17	5	5	2	3.5	0.025	5	2	3.5	0.025	0.25	10
GRP20-010-5	24	80x90x23	5	8	3.2	5.5	0.065	8	3.2	5.5	0.065	0.5	10
GRP35-030-5	24	93x110x38	15	25	10	17	0.1	25	10	17	0.1	1.5	30
GRP50-030-7	48	90x125x55	15	45	18	22.5	0.47	45	18	22.5	0.47	2.5	30

GRP17

GRP20

GRP35

GRP50

NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.

We manufacture actuators to our suit our customers' requirements. Please call us if you do not find the right actuator in this list.

Options & Modifications:

Linear encoder resolutions:	GRP17 & GRP20: 1µm standard, 0.5µm and 0.1µm optional. GRP35 & GRP50: 5µm standard, 1µm, 0.5µm and 0.1µm optional.
Increase of the maximum force & acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of the force accuracy & lifetime:	Extra long life linear guide Low friction linear guide

XY Stages

				Axis 1				Axis 2				
	Voltage [DC]	Size: LxWxH [mm]	Stroke per Axis [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]
LXY10-010-7	48	65x65x81	10	15	4	6	0.06	23	8	11	0.16	0.8
LXY15-015-7	48	111x112x86	15	22	11	13	0.13	25	12	12	0.22	1.65
LXY25-025-8	48	125x125x65	25	42	17	14	0.19	42	17	14	1.5	3.2
LXYM15-015	24/48	230x242.5x55	15	14.7/24.5	5.9/9.8	12.7	0.36	16.4/27.4	6.6/11	13	0.51	2.7

LXY10

LXY15

LXY25

LXYM15

NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list.

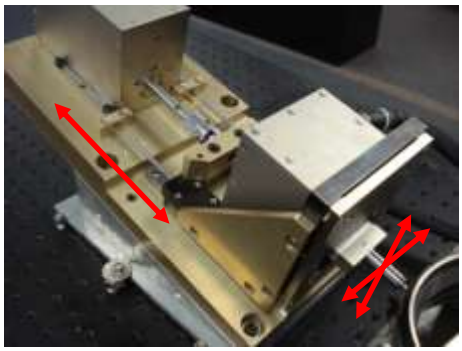
Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm and 0.1µm optional for most units. Consult factory for availability.
Increase of maximum force & acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.

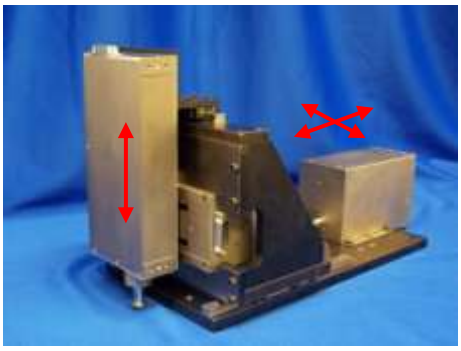
Multi-Axis System

SMAC is pleased to introduce its range of multi-axis control solutions. These systems are able to learn and follow a 3D contour or motion path, with a high degree of speed, precision, accuracy and repeatability. All combinations of SMAC actuators can be used: linear, linear/rotary, linear slide, and XY stage axis.

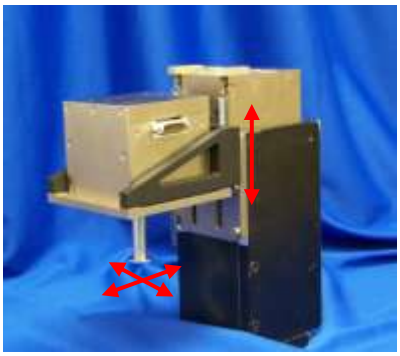
Ideal applications are measuring and testing (QC), dispensing (Bonding), machining (CNC), scoring and cutting, to name a few. SMAC multi-axis 3D systems are unique - they enable total programmability of speed, position and force all at the same time with an exceptional degree of accuracy and repeatability. SMAC multi-axis systems offer a wide range of solutions with a number of highly flexible control interfaces.



LXY15 & LAL95



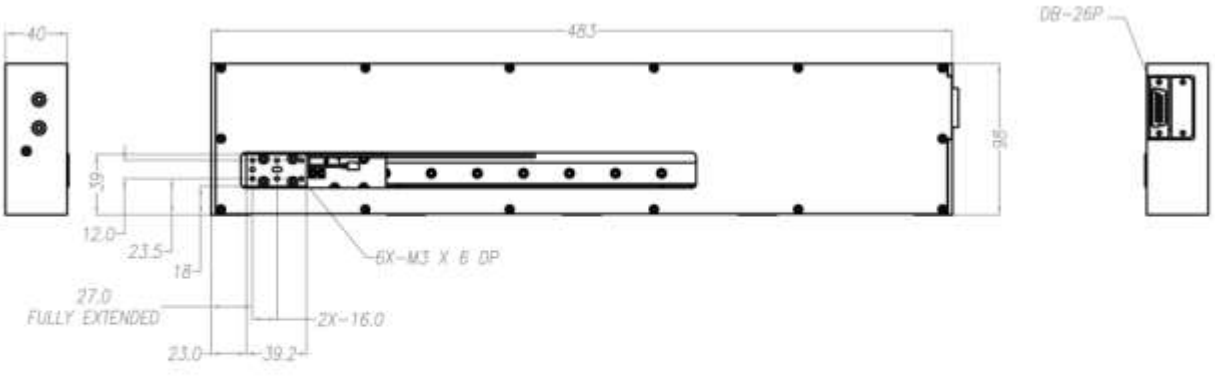
LAL35, LAL95 & LAS95

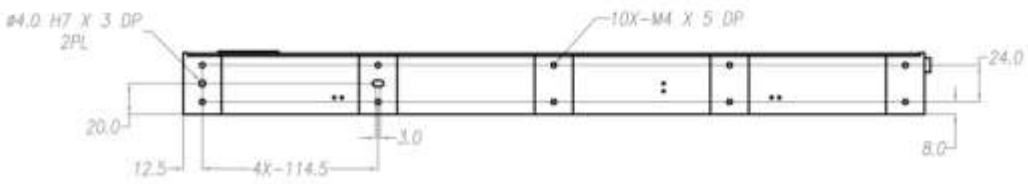


LXY15 & LAS95

Multipole Actuators

These actuators are equipped with several coils and magnets. This allows us to increase the stroke up to 600mm and increases the acceleration up to 10G. A typical application for the multipole actuator is the transport of a smaller actuator, and can achieve very short cycle times with pick & place applications.
Please contact our technical office for further information on multipole actuators.





MLAS35-250
Linear stroke [mm]: 250
Maximum Force [N]: 60
Force Constant [N/A]: 11
Encoder resolution [µm]: 5

Controllers / Amplifiers

SMAC supplies a range of single and multi axis controllers together with stand alone amplifiers and stepper driven driver. Controllers are programmed by mnemonic type command instructions via an RS-232 interface into NVRAM. They require no supplementary software.

NEW

LAC-15 / LAC-20

Single or double axis
brushless controller
Built-in amplifier
Easy expansion to multi-axis
Mode:

- Position
- Velocity
- Force
- Step/Direction

1 Port per axis
RS232 up to 115200 bps
CAN bus 2.0B up to 1MB/s

LAC-1

Single axis controller
Built-in amplifier
Mode:

- Position
- Velocity
- Force

8 input/8 output TTL general purpose I/O's
RS232 Interface
3 analog INPUT

LAC-25

2 axis controller
Built-in amplifier
Mode:

- Position
- Velocity
- Force
- Gearing

Independent or coordinated 2 axis motion
4 input/4 output
Opto-isolated general purpose I/O's
2 analog input/output
RS232 Interface

LAC-45

4 axis controller
Built-in amplifier
Mode:

- Position
- Velocity
- Force
- Gearing

Independent or coordinated 4 axis motion
8 input/8 output
Opto-isolated general purpose I/O's
6 analog input/4 analog output
RS232 Interface

LAA-5

Single axis amplifier
+/- 10 Volt input
3 Amp output

LAD-1

Smart Driver for single axis stepper input to servo output
RS232 Interface

MAAC4-7

4 axis controller brushed/ brushless
Integrated high end amplifier
Advanced math capability
Circular interpolation
Teach path function
Additional controllers can be added to work together on systems requiring more than 4 axes.

LAB-5

Single axis brushless controller, built-in amplifier
Mode:

- Position
- Velocity or Continuous
- Force

4 input/4 output
Opto-isolated general purpose I/O
2 analog input/output
RS-232 Interface

MIOE-8/8

Expansive I/O modual
8 input/8 output
Opto-isolated general purpose I/O

Built-in Controller

Consult factory for available actuator

Cables

Why Use Them?

SMAC actuators are used in numerous high speed, high cycle applications and are guaranteed for millions of cycles. For this reason, it is imperative that the cables used to connect with our actuators are capable of similar arduous duty cycles and life span. Only cables manufactured by SMAC can be guaranteed to meet the rigorous standards required during use. Many years of experience has taught us that cheaper third party cables simply are not up to the task required. They are, in fact, one the most common causes of all the technical problems experienced by our customers.

	Single Axis Controller		Dual Axis Controller		Amplifier	Smart Driver
Actuator	LAC-1	LAC-15	LAC-20	LAC-25	LAA-5	LAD-1
LAL10	LAH-LOD26-03	LAT-26C-0004-03			LAH-LAD26-03	LAH-LSD26-03
LAL15 (*1)	LAH-LOD26-03	LAT-26C-0004-03			LAH-LAD26-03	LAH-LSD26-03
LAL20	LAH-LOD26-03	LAT-26C-0004-03			LAH-LAD26-03	LAH-LSD26-03
LAL35	LAH-LOD26-03	LAT-26C-0004-03			LAH-LAD26-03	LAH-LSD26-03
LAL55	LAH-LOD-03	LAT-25C-0004-03			LAH-LAD-03	LAH-LSD-03
LAL95	LAH-LOD26-03	LAT-26C-0004-03			LAH-LAD26-03	LAH-LSD26-03
LAL300	LAH-LOD-03	LAT-25C-0004-03			LAH-LAD-03	LAH-LSD-03
LAL500	LAH-LOD-03	LAT-25C-0004-03			LAH-LAD-03	LAH-LSD-03
LAR15 (*1)			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	LAH-RSD26-03
LAR20			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	LAH-RSD26-03
LAR31						
LAR35			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	LAH-RSD26-03
LAR37						
LAR55			LAT-25C-0005-03	LAH-RTD-03	LAH-RAD-03	LAH-RSD-03
LAR95			LAT-25C-0005-03	LAH-RTD-03	LAH-RAD-03	LAH-RSD-03
LAR300			LAT-25C-0005-03	LAH-RTD-03	LAH-RAD-03	LAH-RSD-03
2 x LAL10			LAT-26C-0003-03	LAH-LTD26-03		
2 x LAL15(*1)			LAT-26C-0003-03	LAH-LTD26-03		
2 x LAL20			LAT-26C-0003-03	LAH-LTD26-03		
2 x LAL35			LAT-26C-0003-03	LAH-LTD26-03		
2 x LAL55			LAT-25C-0003-03	LAH-LTD-03		
2 x LAL95			LAT-26C-0003-03	LAH-LTD26-03		
2 x LAL300			LAT-25C-0003-03	LAH-LTD-03		
2 x LAL500			LAT-25C-0003-03	LAH-LTD-03		
GRP17 (*1)			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	
GRP20			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	
GRP35			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	
GRP50 (*2)			LAT-26C-0005-03	LAH-RTD26-03	LAH-RAD26-03	
LXY10				LAH-RTD26-03	LAH-RAD26-03	
LXY15				LAH-GRP26-03	LAA-GRP26-03	
LXY25				LAH-GRP26-03	LAA-GRP26-03	
LXYM15				LAH-GRP26-03	LAA-GRP26-03	

All cables except flying lead are 3m standard, optional lengths from minimum 1m up to maximum 10m.

Superflex available: suitable for robotic applications, is available as an option.

*1 Requires LAH-PT30-25 (Jumper to 25 pin cable) or
LAH-PT30-26 (Jumper to 26 pin cable) as supplement.

*2 Old type of GRP50 requires LAH-GRP26-03 cable.

Installation Guideline

Duty cycle

SMAC requires that all units must be operated at less than 40% maximum duty cycle. This can be calculated as follows:

% of max force applied x % of cycle time it is applied = % duty cycle

For example:

- 100% force x 40% of cycle time = 40% duty cycle.
- 60% force x 50% of cycle time = 30% duty cycle.
- 40% force x 100% of cycle time = 40% duty cycle.

The duty cycle must not exceed over a one second time period.

NOTE: Failure to observe this duty cycle recommendation will usually result in the actuator sustaining damage through overloading. Overloading will overheat the coil and may cause deformation or an impact on the magnet housing.

Continuous Force

Peak force applied for duration shorter than 0.4 sec. in one second interval.
(force mode): 40% of peak force, continuous

Force Mode

The specified current may be applied continuously to generate the desired force. However, the recommended continuous force limit should be set in the control program.

In vertical operation, the actuator rod will drop when power is cut off. The rod in a lowered position may be damaged by other moving parts in the machine. A return spring (optional feature) will keep the rod raised. A safety lock-out should be installed in the machine program to confirm the rod location before another interfering component can be moved.

SMAC actuators are equipped with these safety features:

- Limit switches: indicate end-of-stroke
- Index line/home position: used to monitor absolute position
- Breakaway shaft (optional)

Safety Considerations

Unintentional full force may be applied continuously under the following conditions:

- missed target position
- excessive friction
- equipment malfunction, i.e. jam

If left undetected, this can cause destruction of the coil in some units. A servo program should perform the following checks regularly:

- Re-home: to assure target position has not shifted beyond end of stroke
- Time-outs: to shut power down within 10 seconds of error detection
- Following Error Limits: software safety
- Check limit switches
- Check temperature sensor

Mounting

If the actuator is mounted vertically, the shaft drops down when the actuator is powerless. It is possible that other moving parts of the machine may damage the actuator at this position.
A return spring would hold the actuator in an upper position when it is powerless.

A safety function in your machine should check the actuator's current position before other components may move into the working area of the actuator.

Individual Modifications

Many of our standard actuators listed on previous pages are compatible with both add-on options and modifications. In addition to the standard vacuum and spring option SMAC can offer the following modifications subject to approval by the factory.

Linear Guide Options
Increased rigidity and side load tolerance can be gained by using a higher specification “wide guide”. Additionally, in force sensitive applications we can fit a low friction guide.

Double Coil
Integrating an extra coil can enhance both force and acceleration.

Custom Nose-Bush
An extended nose bush with increased side load tolerance are available on many models. We can also offer scraper and wiper seals around the shaft to protect the bearings from excessive wear in harsh environments.

Custom Shafts
In addition to the standard male/female rod ends we can also offer options such as “breakaway” shafts and custom shaft diameters.

10µm T.I.R.
Total indicator run-out under 10µm is available on several linear/rotary models.

Rotary
Increased torque/gear ratio can be gained by using alternative geared motors or direct drive motors.

Higher rotary encoder resolutions are optional. Please consult factory for availability.

If a longer life rotary is required, then we can fit a brushless rotary motor.

Flying Lead
Instead of the standard chassis connector we can offer a flying lead option.

Cable Options
Whenever an SMAC actuator is mounted to any 3rd party device such as a gantry or multi-axis robot, SMAC strongly recommends that a superflex cable is used. Cable lengths with a standard of 3 meters up to a maximum of 10 meters can be offered.

The SMAC 12 Month Product Guarantee

SMAC Corporation designs and manufactures advanced electric actuators. All SMAC actuators are quality products specifically designed and built for long service. Therefore, all actuators appearing in this catalogue are guaranteed for a period of twelve months from the original date of shipment from our factory.

This guarantee is limited to a one-time replacement or rebuilding of any actuator which should fail to operate properly. Actuators must be returned with transportation prepaid and received at our factory within the guarantee period. They will be returned to the customer at the expense of SMAC.

No claims for labour, material, time, damage or transportation are allowable. Actuators damaged as a result of misapplication by the customer are excluded from this guarantee. The guarantee does not apply to loss or damage caused by fire, theft, riot, explosion, labor dispute, act of God or other causes beyond the control of SMAC. SMAC shall in no event be liable for remote, special or consequential damages, under the SMAC guarantee or under any implied warranty.

The above guarantee is our manner of extending the engineering and service resources of the SMAC organization to assure our customers long and continued satisfaction.

The SMAC Rebuild Program

Actuators no longer covered by the SMAC guarantee can be rebuilt under the SMAC rebuild program. Our continued research and development program extends the life of our actuators making them even more reliable under adverse operating conditions. Actuators returned under this program are completely disassembeld, inspected and rebuilt to current operating standards wherever possible, tested and returned within a few days for a reasonable charge (typically 35% of standard list price). For 90 days from date of shipment from our factory, all rebuilt actuators carry the same guarantee as provided for new actuators.

SMAC products have been tested and found to be fully compliant with EN 50082-2 & EN 55011 Group 1, Class A.

Terms & Conditions of Sale

SMAC manufactures and sells actuators, controllers and cables. It has a standard warranty policy covering these products.

SMAC does not offer integration services. These are the responsibility of SMAC distribution and their customers. This means SMAC takes no responsibility for software programming, mechanical designs and all other engineering involved in a project using SMAC devices.

SMAC may, at its discretion, offer technical recommendations or suggestions to help its customer, the distributor, on a particular application. SMAC will only do this once a signed release of responsibility is received from its customer.

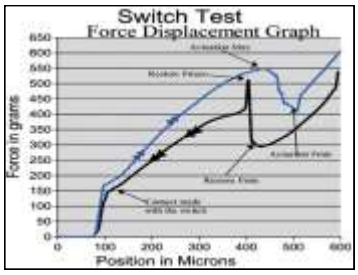
U.S. and world wide patents issued & applied for. SMAC improves its product line on a continuing basis. Specifications and mechanical dimensions are subject to change without notice. Please consult factory before proceeding with your design.

Sample Applications

Effort Test

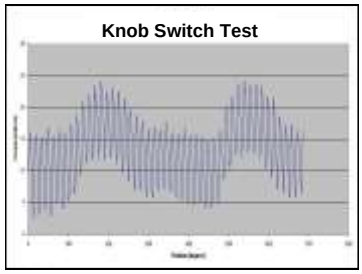
Application Examples

- Automotive switch test
- Cell phone keypads, membrane keypads
- Touch screens
- Valves, sensors and relays
- PC Keyboards, ATM keypads
- Springs, door latches, etc…

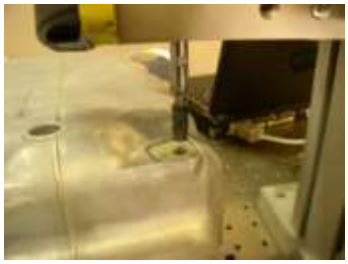


The SMAC Advantage

- Verify hysteresis and switch differential
- Accurate simulation of human motion profiles
- Combined force and position measurement
- High speed life testing
- 1,000,000 cycles in 8 hours
- QA reporting functions to verify 100% test

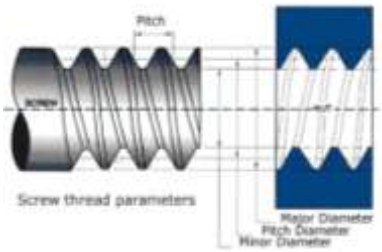


100% Automated Thread Check



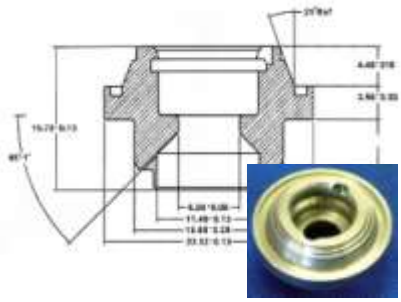
Verification of:

- Oversized / undersized thread
- Number of threads
- Cross thread
- Thread depth
- No thread or dislocated thread
- Pitch measurement
- Shallow / blocked hole



Increase of torque/gear ratio or higher rotary encoder resolutions are available.

Measuring, Bore Gauging and Groove Inspection



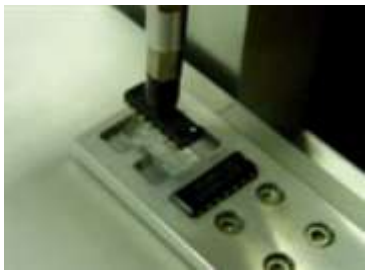
- Airbag components
- Fuel Injector Plug
- Assembly part inside the fuel injector
- XYZ-Mini CMM
- Internal and External Diameter Gauging
- Height Gauging
- Thickness Gauging
- Multiple Point Gauging

Resolution: 5µm (0.0002 inch) to 0.05µm (1.968×10^{-7} inch)

Packaging

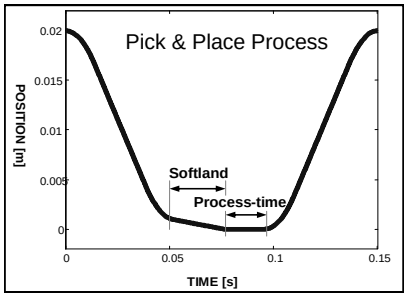
- Screw cap check: Cap rotates to engage slot. Detect and report no/obstructed nozzle & cap
- Labelling: Controls force and velocity to peel labels from adhesive backing
- Bottle ejection: Programmable force & speed control adapt easily to different size of bottles to process.
- Parts feeding: 50,000 cycles/hour, 24/7 operation

Pick & Place



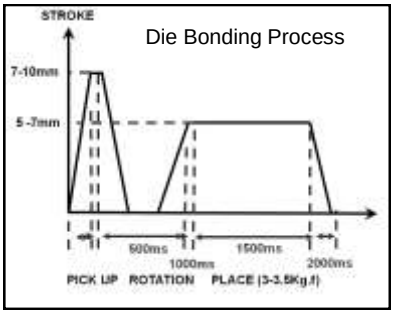
Problem:

- Different pick up height due to mechanical tolerances
- Low throughput of the machine
- Position accuracy – linear and rotary
- Constant force for positioning needed



SMAC Solution:

- Finding the chip surface with the Soft-Land function to avoid damages on the parts
- High speed positioning with a direct drive system
- High resolution positioning up to 0.1 micron
- Up to 50000 counts/revolution - 0.007 degrees
- Controlled precise force
- Shaft run-out 20µm standard. (>10micron option)
- Accurate repeatable positioning at +/- 2 encoder counts
- Programmable force/torque, position and velocity in all axes



Pick & Place Application Examples

- Die bonding
- Smart Card (IC chip mounting)
- Gauging & sorting parts
- Handling small and fragile components

Glass

Measuring Thickness of Thin Flexible Glass

Problem: Accuracy of the current air cylinder, LVDT and force control system.

Solution: The customer used the Soft-Land feature of the SMAC LAL20 in conjunction with a load cell mounted on the rod of the SMAC actuator. The LAL20 is controlled by a dual-axis LAC25.

Glass Grinding

Problem: The grinding process produces a 125µm finish with less than a 50µm variation. Damage to the glass at the beginning and end of the grinding cycle is caused by inadequate force control of the air cylinder which is driving the grind wheel. The force required is 2 to 4 Newtons, with a 5mm stroke.

Solution: Customer was able to land softly on the glass panel and provide a constant force using the "force mode" of the LAL55 at both beginning and end of the stroke.

Glass Application Examples

- Glass cutting, de-burring, positioning
- Glass scoring for solar panels and LCDs
- Chamfering and bevelling

Medical & Bio-Science

- Push/Pull testing of Hypodermic Needles
- Measuring cells height in two conditions, dry and saturated.
- Measuring the amount of wear on a knee replacement plate over x amount of time.

5807 Van Allen Way
Carlsbad, CA 92008
Tel: 760-929-7575
Fax: 760-929-7588
Email: info@smac-mca.com
www.smac-mca.com

National & International Offices

North America

SMAC Midwest (MI)
Suite 175
4595 Broadmoor Ave. S.E.
Grand Rapids, MI 49512
Tel: +1 616-554-5672
Fax: +1 616-554-5762
Email: s_curtiss@sbcglobal.net

SMAC Midwest (IL)
Tel: +1 312-446-8643
Email: haidos@gmail.com

SMAC Mexico
Tel: +52 (0)8381-7999
Email: mepg2205@prodigy.net.mx

Europe

SMAC Europe Ltd.
Ikon House, Rutherford Way
Crawley, West Sussex
United Kingdom RH10 9PB
Tel: +44 (0)1293-520147
Fax: +44 (0)1293-539829
Email: info@smac-mca.co.uk

SMAC The Netherlands
Steenovenweg 5
5708 HN Helmond
Postbus 172, 5700 AD Helmond
Tel: +31 (0)492-472494
Fax: +31 (0)492-472600
Email: info@smac-mca.nl

SMAC Germany
Turnstr. 22c
75228 Ispringen
Tel: +49 (0)7231 8008-760
Fax: +49 (0)7231 8008-744
Email: info@smac-mca.de

SMAC Switzerland
En Chamard 55b
CH-1442 Montagny-près-Yverdon
Tel: +41 (0)79-629-17-49
Fax: +41 (0)24-430-11-17
Email: martin.frei@smac-mca.ch

SMAC Italy
Tel: +39 (0)338 9069289
massimiliano.trabucchi@smac-mca.it

SMAC Iberia (Spain and Portugal)
Tel: +351 (0)96-150-8939
Email: info@smac-mca.pt

Asia

SMAC Japan
Shinwa Bldg.
2-6-8 Hamamatsu-Cho
Minato-Ku, Tokyo
Japan, 105-0013
Tel: +81 (0)3-5733-2450
Fax: +81 (0)3-5733-2470
Email: smacjapan@smac-mca.co.jp

SMAC Taiwan
1F, No. 320, Neihu Rd., Sec 1
Taipei 114, Taiwan, ROC
Tel: +886 (0)22798-6177
Fax: +886 (0)22798-6178
Email: sales@smac-mca.com.tw

SMAC Malaysia
Unit 132 Block A 1st Floor Lobby 7,
Damansara Intan E-Business Park,
Jalan SS22/27, 47400 Petaling Jaya
Selangor
Tel: +60 (0)3772-62304
Fax: +60 (0)3772-60982
Mob: +60 (0)12207-1097
Email: martin@smac-mca.com.my

SMAC China (Shanghai)
Shanghai ZIZHU Science-based
Industrial Park
5004,5005 Room, 5th Floor, 2 Bldg.
555 Dongchuan Road
Shanghai 200240
Tel: +86 (0)21-6435-1661
Fax: +86 (0)21-3429-0092
Mob: +86 (0)133-1186-5359
Email: smac.sh@163.com

SMAC China (Beijing)
Tel: +86-(0)10-84965726
Fax: +86-(0)10-84965726
Email: emily@smac-china.com

SMAC Korea
670-5, Samwon Gold Plaza Bldg. 214
Inchang-Dong,Guri-Si, Kyungki-Do
Korea, Postal # : 471-841
Tel: +82 (0)31-516-9006
Fax: +82 (0)31-516-9007
Mob: +82 (0)10-3934-9006
Email: smac.korea@yahoo.com

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